

3.10 NOISE

This section analyzes potential noise impacts. It is organized in two sections: Section 3.10.1 describes the methodology and section 3.10.2 discusses the affected environment and potential impacts. Unlike most other resource sections in chapter 3, this analysis does not include a common impacts section or separate sections for each site's affected environment and impacts. The streamlined organization is appropriate because most information is on the affected environment, namely ambient sound levels, and potential impacts is effectively presented in one table.

3.10.1 Methodology

Noise impacts from construction and operations and maintenance of the potential new and expansion SPR facilities are evaluated on the basis of two different but important approaches: (1) comparison of estimated noise level with an absolute noise level standard, and (2) comparison of estimated noise level with the estimated existing ambient noise level.

3.10.1.1 Methodology to Estimate Existing Ambient Noise Levels

No sound monitoring data are currently available for any of the proposed new or expansion SPR sites. In the absence of such data, DOE estimated ambient sound levels based on a U.S. EPA study (EPA 1974) that correlated **Day Night Average Noise Level** as a function of population density. The Day Night Average Noise Level is essentially a 24-hour average noise level with a 10-**decibel**, nighttime-noise penalty to account for peoples' increased sensitivity to noise at night. Day Night Average Noise Levels are measured in A-weighted decibels (dBA), as defined in the adjacent text box. Population density data used in this study are based on U.S. Census data.

A-weighted decibels (dBA) is a measure of noise level used to compare noise from various sources. A-weighting approximates the frequency response of the human ear.

Using this approach, DOE estimates ambient noise levels within approximately 1 mile (1.6 kilometers) of the proposed new or expansion SPR sites. The extent to which project construction and operations and maintenance noise levels are greater than ambient noise levels determines how audible project noise levels would be at sensitive receptor locations. The audibility of project-related sound itself does not necessarily constitute an impact, but provides context for potential changes in the acoustic environment. Ambient noise levels were estimated at both existing and proposed SPR sites using population data, thus conservatively ignoring potentially higher existing noise levels from operations at existing sites which would reduce the impact of additional noise from SPR expansion. Ambient noise levels along pipelines and access roads were not estimated since construction noise in those areas would be temporary. Thus, DOE evaluated the noise along pipelines and access roads only by comparing their estimated construction noise to an absolute noise level standard. Power lines will also be installed along pipeline routes, but construction noise associated with this activity is minor compared with pipeline and road construction, so construction noise due to power line installation was not analyzed.

3.10.1.2 Methodology to Estimate Construction Noise

The following construction activities would result in noise:

- Drilling of new cavern entrances;
- Support facility construction;
- Pipeline construction;

- RWI structure construction
- Road construction; and
- Tank farm construction

DOE has measured noise levels for these activities in past SPR studies (DOE 1992), and extrapolated these data to 500 feet (150 meters) as shown in table 3.10-1. These noise levels incorporate the noise levels from trucks used in construction activities. Drilling of shafts and construction of support facilities would occur within the site boundary. Construction of pipelines, terminals, and access roadways would occur largely offsite.

Table 3.10-1: Estimated Construction Activity Noise Level Contributions at 500 feet (150 meters)

Activity	Sound Level, Leq (dBA)
Drilling of shafts	67
Support facility construction	68
Pipeline construction	69
Access roadway construction	68

Leq = Level equivalent

Source: DOE 1992

DOE estimates noise levels at any distance from these activities by assuming that noise sources are point sources and that noise levels attenuate by 6 decibels as the distance from the noise source doubles. Construction noise levels were estimated at sensitive receptors closest to the construction activities. The construction noise analysis accounts for noise generated onsite, as well as pipeline and road construction noise along the entire length of the corridor.

Level equivalent (Leq) is the level of noise (in decibels) averaged over a period of time.

DOE identified sensitive receptors by reviewing USGS maps. The USGS maps typically use dark rectangles to represent homes. Because of the limited resolution and date of the available maps, DOE assumed that the rectangles could represent other types of structures. Thus, DOE conservatively assumed that every structure identified on the USGS maps could be noise-sensitive, meaning residential, schools, libraries, retirement communities, and nursing homes.

The threshold values for construction noise impacts are generally higher than threshold values for operations and maintenance because construction noise is temporary. While standardized criteria have not been developed for assessing construction noise impacts, the Federal Transit Administration (FTA) has construction noise guidelines that have been applied to a wide variety of construction projects (FTA 1995). These guidelines are shown in table 3.10-2.

Table 3.10-2: FTA Construction Noise Guidelines

Land Use	8-hour Leq (dBA)		30-day Average DNL or Leq (dBA)
	Day	Night	
Residential	80	70	DNL = 75 ^a
Commercial	85	85	Leq = 80 ^b
Industrial	90	90	Leq = 85 ^b

Notes:

^a In urban areas with very high ambient noise levels (DNL > 65 dBA), DNL from construction projects should not exceed existing ambient + 10 decibels

^b 24-hour Leq is used, not DNL, since people do not sleep at commercial and industrial locations

DNL = day night average noise level; dBA = A-weighted decibels; Leq = level equivalent

Source: FTA 1995

3.10.1.3 Methodology to Estimate Operations and Maintenance Noise

During operations and maintenance, noise sources would consist of the brine disposal pump pad, well pad, and the RWI pad. Based on noise measurements from previous SPR studies (DOE 1992), noise levels from the brine disposal pad and well pad would be about 60 A-weighted decibels at 500 feet (150 meters) from the source and 57 dBA at 500 feet (150 meters) from the raw water intake. These data can be used to estimate noise levels at any distance, assuming point source propagation. Noise levels were estimated at sensitive receptors closest to the operations and maintenance activities. Sensitive receptors were identified by reviewing USGS maps.

Estimated operations and maintenance noise levels were compared with the criteria of the Department of Housing and Urban Development (HUD), as shown in table 3.10-3 (HUD 2002). As shown in this table, 65 dBA Day Night Average Noise Level is the dividing line between acceptable and unacceptable noise levels for residential locations. This standard is widely accepted by state and Federal agencies and has been adopted in several other standards.

Table 3.10-3: HUD Land Use Compatibility Guidelines for Noise

Land Use Category	Sound Pressure Level (DNL, dBA)			
	Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential	<60	60–65	65–75	>75
Livestock farming	<60	60–75	75–80	>80
Office buildings	<65	65–75	75–80	>80
Wholesale, industrial, manufacturing and utilities	<70	70–80	80–85	>85

Notes:

DNL = day night average noise level; dBA = A-weighted decibels

3.10.2 Impact Analysis

Table 3-10-4 also presents data for all eight proposed new and expansion sites on the following:

- The estimated noise resulting from onsite storage facility construction, offsite pipeline and road construction, and raw water intake.
- The estimated noise resulting from operations and maintenance noise from the storage facility. Data on estimated operations at maintenance noise at the raw water intake structure is presented in the text.
- Whether the estimated noise levels would be audible, would exceed the applicable guidelines of the FTA or the HUD guidelines, and would create potential impacts.

3.10.2.1 Construction Impacts

The construction noise analysis for each storage site is divided into two categories of noise-generating activities: (1) shaft drilling and support facility construction and (2) pipeline and access roadway construction. For each of these categories, the table presents the approximate distance of these activities to the closest sensitive receptor.

Noise levels are presented in terms of both Level equivalent and Day Night Average Noise Level, with the latter metric based upon the assumption that construction activities would take place only during the day. Comparing the projected level to the existing ambient level indicates whether the construction noise would be audible at certain locations. For example, at Chacahoula, the Day Night Average Noise Level for shaft drilling and support facility construction is estimated at 49, which is substantially greater than the estimated existing ambient noise level of 39. Therefore, construction noise would likely be audible in certain locations near this site.

The Bruinsburg, Bayou Choctaw, Big Hill, Richton, and West Hackberry storage sites also have estimated construction noise levels substantially above the existing ambient levels, indicating that construction noise would likely be audible at certain locations. At the Clovelly site, the noise levels are equal to the existing ambient noise level of 37 Day Night Average Noise Level, so the audibility of construction noise would be limited to just a few locations. Similarly, at the Stratton Ridge site, construction noise levels are only somewhat higher than the estimated ambient noise level, so construction noise may be barely audible at certain locations. All of the sites have noise levels lower than the FTA guidelines, as presented in table 3.10-2.

For the pipeline and roads, the estimated noise levels at the nearest sensitive receptors would be below FTA guidelines; and therefore, there would be no significant noise impacts would occur and mitigation would not be necessary.

Tank farms with significant new construction would be located in Peetsville, MS; Anchorage, LA; Jackson, MS; Liberty Station, MS; Pascagoula, MS; and Texas City, TX. Construction activities at these locations are sufficiently far from sensitive receptors such that construction noise levels would be less than the values shown in table 3.10-2, and therefore no significant construction noise impacts would be expected.

Table 3-10.4: Site-Specific Noise Analysis

		Bruinsburg	Chacahoula	Clovelly	Richton	Stratton Ridge	Bayou Choctaw	Big Hill	West Hackberry
Existing ambient noise	Population density (persons/mile ²)	57	47	32	31	33	30	3	8
	Estimated ambient noise level (DNL)	40	39	37	37	37	37	27	31
Construction noise	From storage site								
	Distance to closest receptors (feet)	6,230	3,570	13,770	4,490	10,720	3,990	2,130	2,650
	Noise level (dBA, Leq)	46	51	39	49	41	50	55	54
	Noise level (dBA, DNL)	44	49	37	47	39	48	53	52
	Audible construction noise?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Higher than FTA guidelines?	No	No	No	No	No	No	No	No
	Construction noise impacts?	No	No	No	No	No	No	No	No
	From pipeline, power line, and road construction^a								
	Distance to closest receptors (feet)	390	2,710	11,120	240	9,810	NA	210	N/A
	Noise level (dBA, Leq)	71	54	42	75	43	NA	76	N/A
	Noise level (dBA, DNL)	69	52	40	73	41	NA	74	N/A
	Higher than FTA guidelines?	No	No	No	No	No	NA	No	N/A
	Construction noise impacts?	No	No	No	No	No	NA	No	N/A
Operations and maintenance noise for storage site	Distance to closest receptors (feet)	6,230	3,570	13,770	4,490	10,720	3,990	2,130	2,650
	Noise level (dBA, Leq)	38	43	N/A	41	N/A	N/A	N/A	N/A
	Noise level (dBA, DNL)	36	41	29	39	31	40	45	44
	Audible O&M noise?	No	Yes	No	Yes	No	Yes	Yes	Yes
	Higher than HUD guidelines?	No	No	No	No	No	No	No	No
	O&M noise impacts?	No	No	No	No	No	No	No	No

Notes:

^a Audibility of noise from pipeline, power line, and road construction was not estimated.

dBA = A-weighted decibels; DNL = day night average noise level; Leq = Level equivalent; N/A = not applicable; O&M = operations and maintenance; mile² = 2.59 kilometers²; feet = 0.3048 meters

3.10.2.2 Operations and Maintenance Impacts

The estimated operations and maintenance noise analysis includes data for the distance of the closest sensitive receptors from the following sources of noise: brine disposal pump pad, well pad, and RWI pad. The resulting noise levels are presented in terms of A-weighted and Day Night Average Noise Level, with the latter measurement based upon the assumption that operations and maintenance activities will take place only during the daytime hours. As with estimated construction noise, the operations noise levels are compared with the existing ambient levels to determine whether noise will be audible at the receptor distance. If one were to precisely calculate operational noise levels, estimated noise levels would be logarithmically added to ambient noise levels. This extra calculation is unnecessary in determining whether or not operations would be audible. Audibility can be determined by comparing estimated noise level to the ambient noise level.

At the Clovelly, Bruinsburg, and Stratton Ridge storage sites, the operations and maintenance noise level would be lower than the existing ambient levels, so noise sources would not likely be audible at nearby receptors. At the Chacahoula, Richton, and Bayou Choctaw sites, the operations and maintenance levels would be slightly greater than the estimated ambient noise level, so noise sources might be barely audible at certain nearby receptors. At the Big Hill and West Hackberry sites, the operations and maintenance levels would be substantially higher than the estimated ambient noise levels, so noise sources would be audible at nearby receptors. Estimated operations and maintenance noise levels at all sites, however, would be lower than the HUD Land Use Compatibility Guidelines (as presented in table 3.10-3), so no significant noise impacts associated with operations and maintenance would occur, and mitigation would be unnecessary.

Sensitive receptors do not appear to be near the raw water intake at the proposed sites except for Stratton Ridge where, based on aerial photographs, receptors are as close as 1,640 feet (500 meters). At that distance, raw water intake noise would be approximately 45 DNL, which is greater than the estimated ambient level (36 DNL) at this location. Consequently, raw water intake noise would be audible at these receptors, but would not constitute a significant impact since the noise level would be substantially lower than the HUD guidelines. A wildlife sanctuary is also in the vicinity of the raw water intake, and some wildlife noise impacts might occur depending on the exact proximity to the raw water intake. The raw water intake would be located just across the ICW from the sanctuary. See section 3.7.8 for a discussion of the potential impact of the noise on the wildlife in the sanctuary.

Both construction and operation and maintenance would cause only minor noise impacts based on the location of the nearest of residences and other sensitive receptors around the proposed new and expansion sites, past experience with the construction and operations and maintenance of existing SPR sites, and the results of this noise analysis.